Review Material for Superpave Mix Design Technologist Requalification Exam

The following information is an overview of the materials that you should reference and examples of mathematical computations with which you should be familiar in regards to the 2005 Superpave Mix Design Technologist Requalification Exam. It should be noted that the following is not an "all-inclusive" list. Participants are required to be familiar with all specifications, methods, guidelines, warrants, and practices required by the Department, not just the ones pertaining to this exam.

Referenced documents:

KY Specifications

- Division 400
- Division 800
- Supplemental Specs.

AASHTO Standards

- AASHTO M323
- AASHTO PP35
- AASHTO R30
- AASHTO R35
- AASHTO T304
- AASHTO T312

Kentucky Methods (KM)

- KM 64-411
- KM 64-421
- KM 64-427
- KM 64-443

Items of interest:

- Material and/or mix design submittal requirements for the Materials Central Laboratory (MCL) and/or District laboratory
- Aggregate consensus property and gradation requirements
- Volumetric property requirements
- Recycled asphalt pavement (RAP) usage in mix designs
- Warrants for Selecting Asphalt Mixtures and Compaction Options

Review of questions requiring calculations:

The following types of questions (and subsequent answers) could be found on the 2005 Superpave Mix Design Technologist Requalification Exam. Please note: only a silent, non-printing, non-programmable calculator can be used during the examination.

NOTE: The following questions (A-F only) should be answered using the information given in Table 1 (attached on page 4).

A. Given the mixture information in Table 1, what is the average percentage of air voids (V_a) at N_{des} at 4.1% binder?

a. 4.2 % b. 95.8 %

c. 13.7 % d. 86.3 %

B. Given the mixture information in Table 1, what is the average corrected specimen relative density at $N_{initial}$ ($\%G_{mmNini}$) at 4.1% binder?

a. 4.2 % b. 95.8 %

c. 13.7 % d. 86.3 %

C. Given the mixture information in Table 1, what is the effective asphalt content (P_{be}) at 4.1% binder?

a. 3.7 % b. 3.9 %

c. 4.1 % d. 4.3 %

D. Given the mixture information in Table 1, does the average percentage of voids-in-the mineral aggregate (VMA) satisfy the applicable criteria for a CL3 ASPH BASE 0.75D PG64-22 at 4.1 % binder?

a. Yes b. No

E. Given the mixture information in Table 1, does the average percentage of voids filled with asphalt (VFA) satisfy the applicable criteria for a CL3 ASPH BASE 0.75D PG64-22 at 4.1% binder?

a. Yes b. No

F. Does the average of the two specimens in Table 1 satisfy the bulk specific gravity (G_{mb}) tolerance for laboratory mix designs at the given asphalt content if the average G_{mb} of the Department's verification samples is 2.391?

a. Yes b. No

G. If a combined job-mix-formula (JMF) for a given mixture has 93% passing the 1 ½-in. sieve, 89% passing the 1-in. sieve, 79% passing the ¾-in. sieve, 62% passing the ½-in. sieve, and 45% passing the $^{3}/_{8}$-in. sieve, what is the nominal-maximum size of the mixture?

a. 1 ½ in. b. 1 in.

c. 3/4 in. d. 1/2 in.

H. If the approved optimum asphalt content of a given mixture is 3.7%, with a corresponding asphalt binder absorption of 0.77% by weight of the mixture, calculate the dust-to-binder ratio for the mixture. NOTE: The percent passing the No. 200 sieve from the approved JMF is 5.5%.

a. 1.9% b. 1.5%

c. 0.7% d. 0.5%

I. Does the answer to the above question (H) meet the requirements for dust-to-binder ratio in Kentucky?

a. Yes b. No

TABLE 1

Specimen Number	PG Binder Content (%)	Measured $G_{mb\ @\ N_{des}}$	Spec. Heights (mm)	
			N_{ini}	N_{des}
1	4.1	2.368	129.5	116.6
2	4.1	2.362	128.8	116.1

G_{mm} = 2.468 at 4.1 % binder
G_{sb} of combined aggregate = 2.61
G_b = 1.030

Answers to Questions:

A. **a.**
B. **d.**
C. **b.**
D. **a.**
E. **a.**
F. **b.**
G. **a.**
H. **a.**
I. **b.**